1211-1212

How Fast Are You?

An In-depth Study on Reaction Time

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Science Fair

Abstract

Have you ever thought that a few seconds on the phone would ever cause you to get into an accident; many people think that’s the case. This project consisted of a series of simulations that tested for one’s reaction time. The problem being test was if being focused on something that is not the task at hand could alter your reaction time. In the project, the participants played three games that would measure their reaction time to sound and sights while playing the games. The first game consisted of tranquilizing sheep (control), the second consisted of flying a helicopter and reacting to a sound (reaction to sound), and the last was a game where the participant was required to text and drive (reaction to sound), and the last was a game where the participant’s reaction time did alter when they became more and more focused on the game. This especially showed in the copter game (this is proven in Randi Warner’s, who’s times out of the three tests were 20, 40, and 52 hundredths of a second, and Cary Anderson’s, who’s times were 20, 40, and 41 hundredths of a second). This project can be applied to the reaction times of drivers who text and drive.

Problem

Can being focused on another activity greatly affect one’s reaction time?

Hypothesis

If a subject is exposed to an external source, then their reaction time will lengthen if they are focused on a different external source.

Experimentation

Before I started experimenting, I researched the topic of reaction time to gain a further understanding on the topic. After researching, I found that reactions come from stimuli, which are external influences that cause a reaction. For example, when someone touches a hot stove, the sensory nerves in that persons head send a signal to the cerebrum in the brain which says “this object is hot”. Your cerebrum processes it and sends a signal to your motor nerves that says “this objects is hot, move!” These reactions happen so fast that we don’t even have to think about them. In this project, I put the reaction time of ordinary people to the test where they were required to react to an external source while they were not specifically focused on that source to see whether or not their reaction time would change. In my project, reaction to sights and sound were the two independent variables I tested for. I predicted that if someone was so focused on an external source, then their reaction time would lengthen. When dealing with reaction time, all my measures were measured in hundredths of seconds to account for the extremely fast reactions.

Materials List

\*Computers

\*Two Stopwatches

\*Buzzer

My project consisted of three different games played on the computer, each testing the reaction time of the subject. The first game was the control for the project that tested one’s reaction to sheep that would run across the screen. The goal of the game was to hit the tranquilize button to stop the five escaping sheep as soon as they would come across the screen. At the end of the game, I collected the average recorded reaction time for each sheep tranquilized. The second game was called Copter. The person would focus on flying a helicopter with one of two synced stop watches in hand. The tester held the other watch and a buzzer in their hands. The tester would hit the buzzer and his stopwatch as the same time. The subject would be focused on playing the game, and would have to react to the sound and hit their stopwatch. The difference in times would be recorded. This was done 3 times. The last game was a driving game where the subject guided their vehicle through one through six of the marked toll gates. After every couple gates a text message would appear and they would have to answer the text message and continue driving. At the end, the average time lengthened while texting was posted with a lot more information. The “seconds slower while texting” and “percent of gates missed” categories were recorded after the game.

Discussion

The purpose of this experiment was to see if someone’s reaction time could be altered, and through the results I was able to make conclusions that reaction time is indeed altered while someone is not focused on the task at hand. This is proven in Tables 1 and 2 and Figure 1. From this project, I have concluded many different things concerning reaction time through my subjects. One of the things I have concluded is that it takes longer to react to something visual then to something you hear. This is proven in Figure 1 how the average reaction time for the visual tests is a lot higher than the average time for sound tests. Error could have occurred though in the sound test with the timer’s accuracy when hitting the buzzer and the stopwatch because human error could have occurred. A solution to the problem could be to find or create another simulation that could give a more accurate reaction time. I have also concluded that males have a higher reaction time than females. This is proven in the average reaction times for women in Table One are higher, but there are high peaks for Katie Witmer and Graeme Nelson which I could have foresaw due to their easy frustration as shown in Figure 7 and 12. Error could have occurred if the subjects were distracted by other external influences at the time of the control. These influences could include other people or maybe even sounds emitted thorough different things around them. If this test is continued in the future, the errors in the procedure can be removed if there is a limit to the number of people in the testing room and be in a place with limited noise. One of the most important conclusions I have made though this experiment involves the subject’s level of focus. I found that with over half of the people tested, they showed increases in their previous reaction time during the third trial of the sound test (copter challenge). This shows that as they played the game they became so focused in not crashing the helicopter that when it came time to react to their buzzer, their time lengthened as shown in Table 1.

If I could do this experiment differently with some changes, some changes would include the number of participants and the types of tests. If I could test a more even number of males to females, perhaps with a larger group of people, the results could solidify if males actually have a better reaction time than females do. Another thing worth changing would be the types of test done. With the results found with sight and sound, more tests could also be done with touch, taste, and even smell. The results for this project could be pushed even further if this test would be continued.

Conclusion

My hypothesis stated that a person’s reaction time would be increased from external influences distracting them. I found this to be true through all the testing in this project. A person’s reaction time is greatly increased while they are distracted as shown in Figure 1. Can being focused on another activity greatly affect one’s reaction time? Yes it can.

Table 1—Original Data Sheet used to collect data for the three games in the project

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Name | Sheep Average  (sec) | Copter Challenge (sec) | | | Gauging Your Distraction | |
| #1 | #2 | #3 | Seconds slower while texting | Percent of Gates missed |
| Coby Ward | 0.2702 | .31 | .42 | .86 | .59 | 6 |
| Kristopher Ward | 0.214 | .41 | .26 | .38 | .18 | 14 |
| Katelyn Witmer | 0.401 | .80 | .33 | .42 | .65 | 48 |
| Jonathan Devita | 0.2722 | .39 | .45 | .39 | .35 | 10 |
| Randi Warner | 0.3766 | .20 | .40 | .52 | .51 | 33 |
| Drew Landis | 0.2448 | .31 | .44 | .44 | .41 | 6 |
| Graeme Nelson | 0.3704 | .62 | .44 | .34 | .6 | 16 |
| Cary Anderson | 0.286 | .20 | .40 | .41 | .53 | 27 |
| Emily McGinn | 0.3242 | .61 | .27 | .38 | .47 | 27 |
| Abbie Miller | 0.3136 | .64 | .33 | .71 | .45 | 10 |
| Tyler Broadwater | 0.3228 | .27 | .27 | .48 | .48 | 10 |
| Chance King | 0.2884 | .74 | .42 | .37 | .56 | 23 |
| Chris Ward | 0.3765 | .48 | .54 | .67 | .53 | 32 |
| Betty Ward | 0.3763 | .53 | .50 | .63 | .32 | 27 |

Table 2—Compares average reaction times for external visual and sound sources with the control numerically.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Average Reaction Time Control Test One(Sec) | Average Reaction Time While Not Focused on Hearing (Sec) | Average Reaction Time While Not Visually Focused Test 3 (Sec) |
| Coby Ward | 0.2702 | 0.53 | 0.6602 |
| Kristopher Ward | 0.214 | 0.35 | 0.394 |
| Katelyn Witmer | 0.401 | 0.527 | 1.051 |
| Jonathan Devita | 0.2722 | 0.38 | 0.6272 |
| Randi Warner | 0.3766 | 0.373 | 0.8866 |
| Drew Landis | 0.2448 | 0.397 | 0.6548 |
| Graeme Nelson | 0.3704 | 0.467 | 0.9704 |
| Cary Anderson | 0.286 | 0.337 | 0.816 |
| Emily McGinn | 0.3242 | 0.42 | 0.7942 |
| Abbie Miller | 0.3136 | 0.56 | 0.7636 |
| Tyler Broadwater | 0.3228 | 0.307 | 0.8028 |
| Chance King | 0.2884 | 0.51 | 0.8484 |
| Chris Ward | 0.3463 | 0.563 | 0.7963 |
| Betty Ward | 0.3763 | 0.553 | 0.9063 |

Figure 1—Average reaction times for external visual and sound sources compared to the control.

Applications

This project can be a real influence in the real world. When I first chose this project, it tied hand and hand with texting while driving. I found that someone who texts while driving are much more likely to get into an accident then someone who doesn’t. I also found that this project can be applied for much more. For instance, anyone that may have a job where they need, their 100% focus, if they are not doing that, bad things can happen. An example of that would be people who work in construction. If they make a mistake, they could ruin an entire structure. If this project were continued to include variables such as touch, taste, or smell. With these installments, future tests could help many professions such as bomb experts (they can smell certain compounds in time to stop a bomb), cooks (they can smell and taste when their food is going bad), and lastly the drivers who text while driving. Especially the last simulation proves that texting while driving can be dangerous. If you can’t do it in a computer game, what makes you think you can do it any better in real life?

Pictures

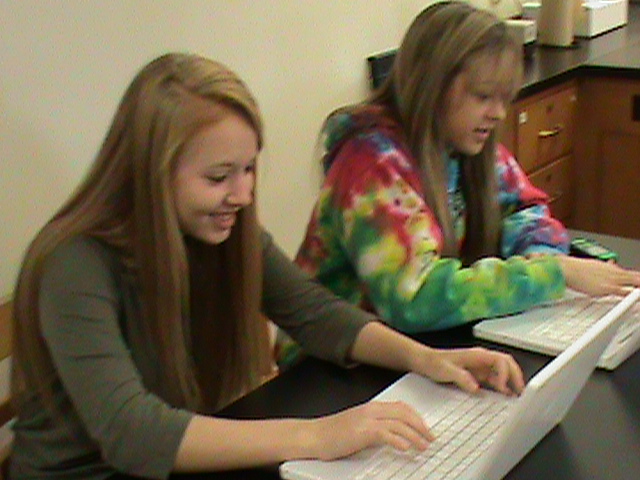
 

Figure 2 Figure 3

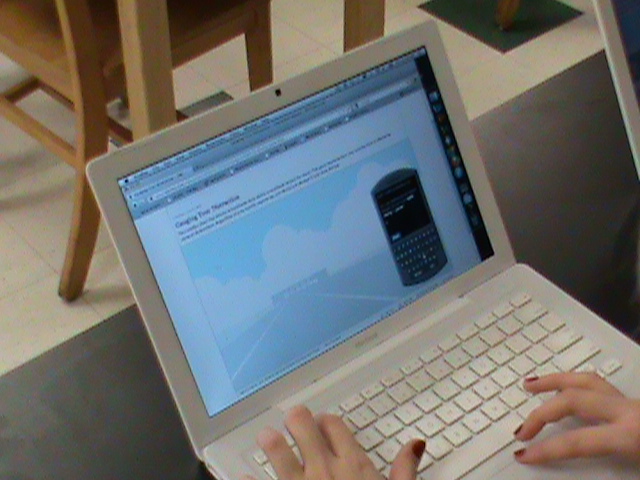
 

Figure 4 Figure 5

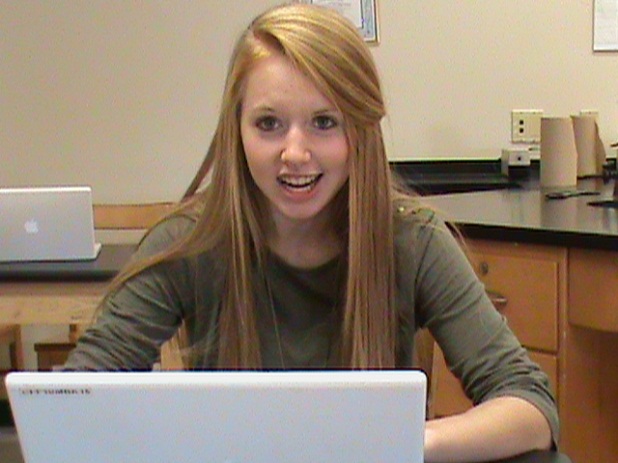


Figure 6 Figure 7

Figure8 Figure 9

Figure 10 Figure 11

Figure 12 Figure 13

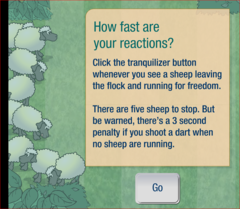
 Figure 14—Game one (control group)

 Figure 15—Game two (reaction to sound)

 Figure 16—Game Three (visual reaction)